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Unplanned Explosions of Munition Stockpiles

Unplanned explosions at munition sites in places such as Nigeria, the Democratic Republic of the Congo and the United States result in mass casualties to civilians and government personnel. Although new ammunition-storage practices in the United States expanded to include a military role, not all countries have evolved their practices as quickly, leaving them more susceptible to continued explosions. The increasing role of urbanization will make ammunition site management even more important in the 21st century.

by Ken Rutherford and Matthew Williams [Center for International Stabilization and Recovery]

On 20 January 2015, survivors of one of history's worst unplanned explosions at a munition site protested that international donors raised insufficient disbursement funds for the surviving families. These individuals survived a horrendous explosion 13 years earlier when an ammunition depot in the center of Lagos, Nigeria, exploded on 27 January 2002, resulting in more than 1,100 deaths and 5,000 injuries.¹ Survivors of the explosions find themselves dealing with their wounds and the death of their loved ones without the previously promised assistance to aid in the recovery of their mental and physical wounds.

The Lagos explosion, although a particularly deadly example, is one of many that have occurred across the globe in the past decade. In 2008, an explosion at Gërdec, Albania, resulted in the evacuation of 4,000 people and destruction of 308 buildings. In March 2012, an unplanned explosion at a munition site in Brazzaville, Democratic Republic of the Congo, left nearly 300 people dead and 2,300 wounded. The Brazzaville site's placement in an urban center is typical of countries with security concerns over ammunition site management and a history of coups.²

This positioning also highlights the dangerous relationship between urbanization and placement of ammunition sites in urban centers. This practice means that already vulnerable and marginalized populations, typically living in highly-dense urban environments, are at greater risk to face the disproportionate impact of unplanned explosions.² Lagos is considered a **megacity**, a result of the booming population and urbanization pressure in Nigeria. With 45 million people

in 1960, Nigeria now has a population of 170 million with projections indicating that the population will reach 400 million in 30 years.^{4,5} In the past, much of the world's ammunition stockpiles were erected in unpopulated regions surrounding urban areas. However, demographic pressure caused by burgeoning population growth has resulted in urban populations creeping past city limits. Consequently, the distance between populations and ammunition stockpiles has shrunk.

U.S. Unplanned Explosions

Unplanned explosions within the United States serve as a prime example of the dangers of improperly stored munitions, with several unplanned explosions resulting in severe casualties, and many of the victims were of lower socioeconomic status. New Jersey's Lake Denmark disaster in 1926 and California's Port Chicago disaster in 1944 mark two key points in the history of unplanned explosions in the United States, serving as an impetus for implementation of safer explosive- and ordnance-management practices, which can be applied to contemporary stockpile management.^{6,7}

Port Chicago. For the United States, the largest, most violent explosion of World War II did not occur in a conflict zone but in a major U.S. city. On 7 July 1944, at Port Chicago Naval Magazine, the SS *Quinault Victory* was loaded with ammunition for its first trip as an ammunition carrier. About 45 minutes into the loading process, two explosions killed everyone aboard the vessel and the nearby SS *Bryan*, which was also being loaded with ammunition. A total of 320 men were killed, 202 of whom were African-American enlisted men working on



Looking eastward in early 1944, the town of Port Chicago is in the upper right corner. Utility and personnel piers extend toward the two sections of Seal Island in the lower left corner. The munitions-loading pier curves to the left beyond 20-odd revetments. Marshy tidal zones separate the munitions pier from barracks near the personnel pier and near the town.

Photo courtesy of the Port Chicago Naval Magazine National Memorial.



This view looks south from the Ship Pier, showing the wreckage of building A-7 (joiner shop) in the right of the photo. There is a piece of twisted steel plating just to the left of the long pole, left center.

Photo courtesy of the U.S. Naval Historical Center.

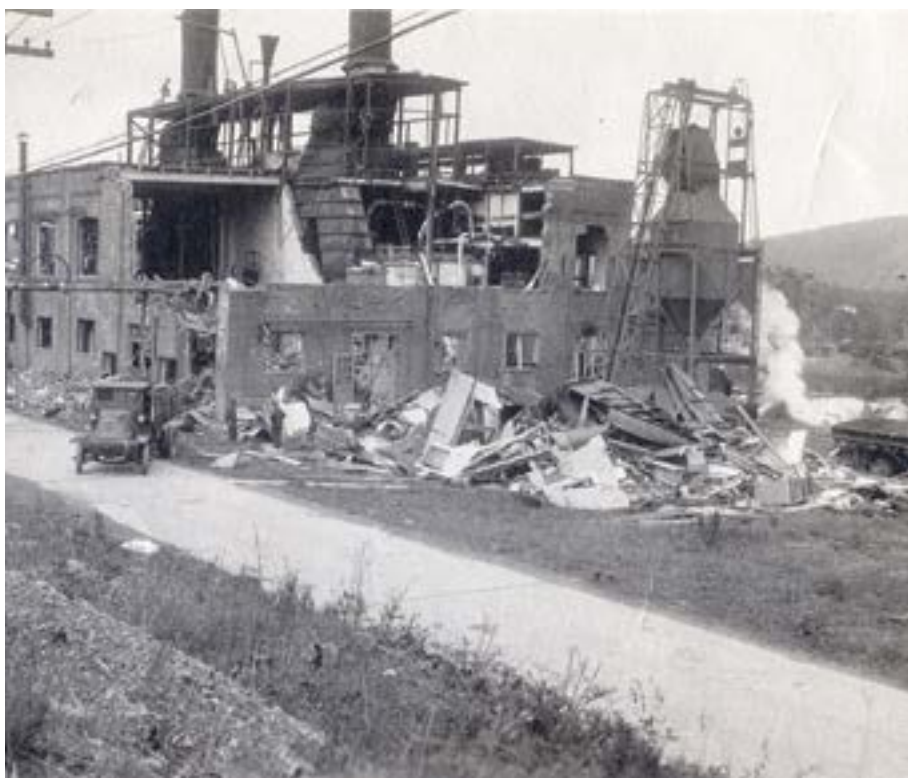


This view looks north, showing the wreckage of building A-7 (joiner shop) in the center and ship pier beyond. A bulldozer and damaged automobiles are seen in the foreground, railway crane at left, and scattered pilings.

Photo courtesy of the U.S. Naval Historical Center.

the loading detail; moreover, 390 were injured, 202 of whom were also African-American enlisted men. The military was segregated at the time, and black men were prohibited from combat service. Laboring at munition plants thus became one possible avenue of work. In the case of Port Chicago, the racial divide was evident from the start, as the African-American loaders served under a staff of white officers who held competitions to see whose team could load ammunition onto the ships the fastest. The loaders themselves had no training and had to purchase safety equipment, such as gloves, themselves.⁸ The aftermath of the explosion spurred the realization that new management practices, including required training certification for on-dock loading personnel and a munition redesign to include additional safety features, were necessary for safer munitions loading and storage.⁷

Denmark Naval Ammunition Depot. The need for safer, long-term storage plans in this new age of military ordnance was apparent decades ago with the 19 July 1926 explosion at the Lake Denmark Naval Ammunition Depot that killed 19 and injured more than 50 civilians. A lightning strike at Magazine Number 8, which was overloaded with leftover ordnance from WWI, caused a fire in the magazine, from which the resulting explosions ignited secondary explosions in nearby magazines. All structures within 2,700 ft (822.96 m) were destroyed. The placement of the magazines exacerbated the effects of the explosion, and a subsequent investigation revealed that one magazine holding 1,691,000 pounds (734,366.05 kg) of TNT was only 80 feet (24.38 m) away from another containing 789,400 pounds (240.49 kg) of TNT.⁹ In response to the disaster, the U.S. Government implemented a broad range of ammunition storage management practices, including standardized designs for



These four photos show the destruction at Picatinny Arsenal resulting from the explosions and shock waves at the nearby Naval Ammunition Depot at Lake Denmark, New Jersey (U.S.).

Photos courtesy of the Dover Area Historical Society.



magazine. Referred to as an igloo due to its shape, this new structure was a low, arch-shaped building that would later be covered with earth.^{6,9}

New Stockpile Practices

Over the last few decades, concern has grown regarding surveillance, renovation and demilitarization of stockpiles due to storage, explosion and proliferation threats. Thus, new ammunition storage management practices evolved.¹⁰ Perhaps the greatest change that occurred involved transferring management responsibilities to the private sector for many storage facilities previously operated by the military. In fact, the United States is the largest market for private sector demilitarization services and has a stockpile of 587,000 tons of ammunition in need of demilitarization. The annual funding for the demilitarization of these munitions is about US\$146 million, or around the U.S. Department of State's annual budget for conventional weapons destruction.⁹

These new ammunition management practices allowed the United States to be more fortunate than other countries hosting large amounts of ammunition. Over the past 25 years, there have been reports of more than 400 unplanned explosions at various ammunition sites around the world.¹¹ In contrast, the United States has only reported 19 unplanned explosions at ammunition sites since 1984, resulting in four deaths.¹²

Despite Precautions, Explosions Occur

Using private contractors for stockpile management, however, brings



ammunition storage structures in ammunition plants, storage depots and installations. The United States also adopted distance-spacing guidelines for the placement of magazines. The Lake Denmark disaster resulted in the creation of a modern type of ammunition storage structure: the **igloo** ammunition

other issues, such as conflicting accountabilities and responsibilities among a host of U.S. Federal and State agencies, e.g., the Environmental Protection Agency (EPA), the Department of Defense and the private sector. For example, in 2012, a massive ammunition explosion at Camp Minden

in Louisiana was violent enough that the nearby town of Doyline was evacuated for one week. A subsequent investigation found that the Army and its private contractor, Explo Systems Inc. (ESI) had illegally stored and handled the explosives. Despite continued risks to public health, the explosives were not immediately secured in the aftermath of the explosion because it was unclear which of the many actors involved was responsible for the demilitarization of the explosives. ESI ultimately filed for bankruptcy, and in 2014, the EPA ordered the Army to take responsibility for the explosives.¹²

That the majority of the 19 unplanned explosions occurring in the United States since 1984 were due to “lack of surveillance leading to ammo deterioration” is another cause for concern.¹³ This suggests that the United States needs to improve its surveillance and management of ammunition depots as stockpiling and demilitarization remain important tasks. The continuing changes in ordnance brought about by modern technology and new warfighter requirements brings a need for new surveillance and storage procedures for these technologies. Addressing these needs will be a key requirement for U.S. ammunition storage practices. Ensuring transparency with private contractors is also crucial.

There is potential for a nonprofit centered on providing ammunition management, best-practices training, assessment and surveillance of sites, and a response team to possible trouble sites. By endorsing nongovernmental organizations (NGO) that possess established recognition in the area of ammunition storage and transfer, the federal government could add legitimacy to the process of outsourcing ammunition management and provide state authorities and other potential stakeholders

with a range of trusted NGOs, which would ease the accountability concerns seen in Doyline and avoid promulgation of new regulations that cause division of accountability between state and federal authorities.

The Dangers Continue

Lessons learned from unplanned ammunition stockpile explosions in the United States can be applied to the global community. These incidents indicate a clear need for proper training and certification for personnel who handle ordnance, as demonstrated in the Port Chicago explosion. Spacing guidelines, a procedure taken from the Lake Denmark explosion, are particularly applicable to modern ammunition site management. Incidents in Brazzaville and Lagos highlight the danger to civilian populations in close proximity to ammunition stockpiles. Accountability measures, particularly when dealing with private-sector contractors, will continue to become more important to the international community as the safe disposal and management of ammunition is outsourced to private contractors.

Survivors of the explosion in Lagos, Nigeria, signal the continuing impacts of unplanned explosions on society. By taking steps to ensure modern ammunition-management practices are up to the task of preventing deadly and costly explosions, the international community can help prevent these disasters from reoccurring. ©

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